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(54) Method and device for the automatic control of the capacity of a buffer storage magazine

(57) In a plant for feeding rod-like articles e.g. cigarettes to a processing machine, a buffer storage magazine (13) communicates with a transit zone (8) having an inlet (108) for the incoming cigarettes and an outlet (208) for the outgoing cigarettes, the capacity of the magazine (13) being varied by means of a reversible element (16) movable to increase or reduce the capacity of the magazine to accept cigarettes from or return cigarettes to said transit zone (8) according to whether the rate of flow of the incoming cigarettes is greater or smaller than the rate of flow of the outgoing cigarettes. The cigarettes entering and leaving the transit zone (8) are counted and the difference between the two values used to act upon the element (16) to increase or reduce the capacity of the magazine depending upon the positive or negative sign of said difference and with a speed of proportional to the absolute value of said difference.

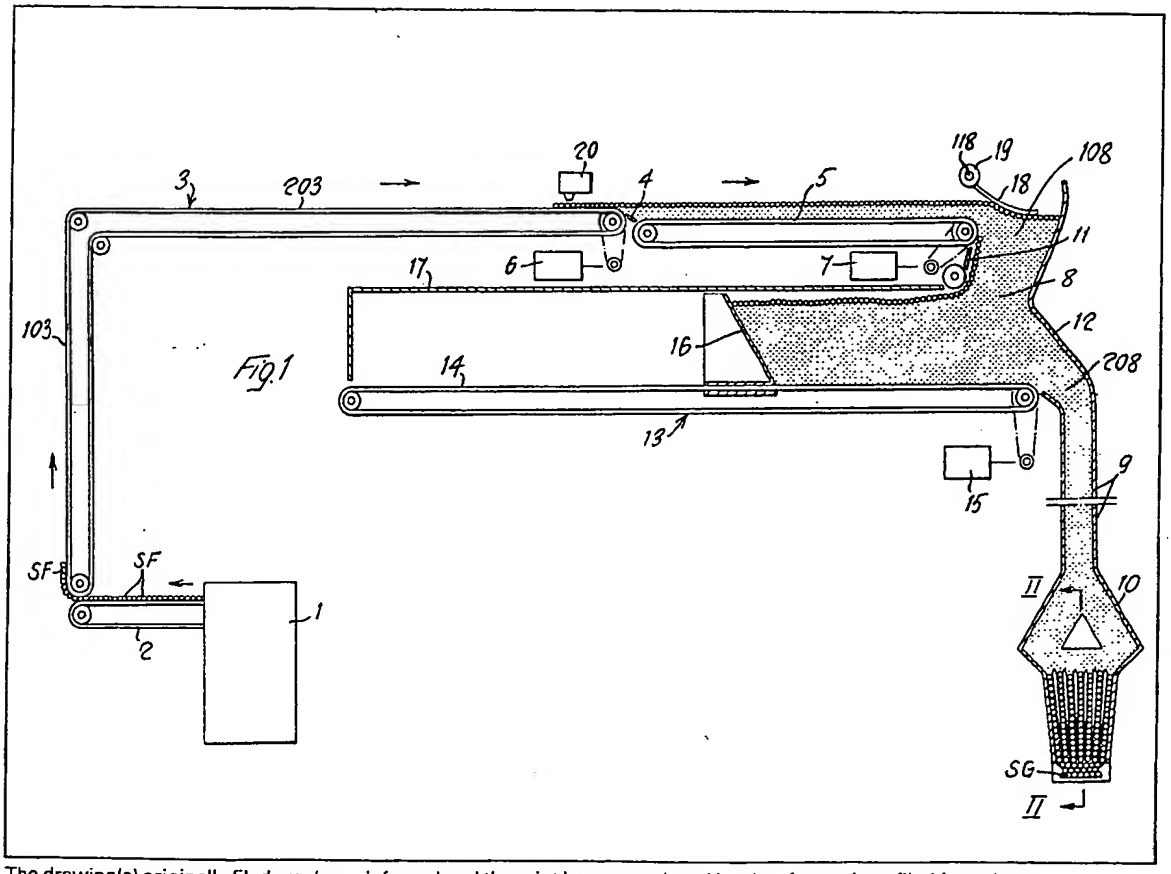

Fig.1

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The drawing(s) originally filed was/were informal and the print here reproduced is taken from a later filed formal copy.

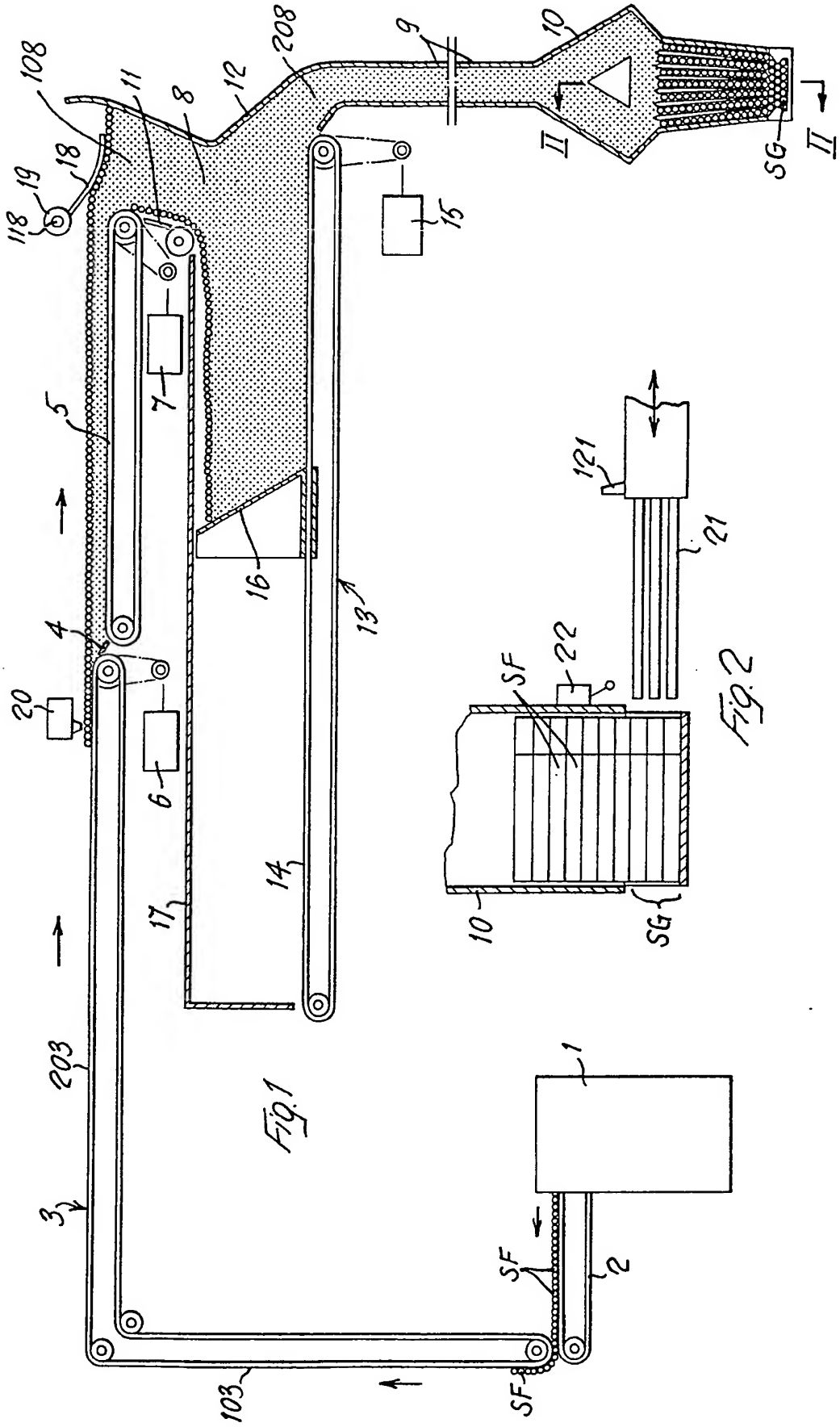
108
11
8
12
208
9
10
II
SG
II
18
19
118
15
5
7
16
13
4
20
6
14
17
203
3
1
SF
2
103
SF
121
21
22
SF
10
SG

Fig.1

Fig.2

SPECIFICATION

Method and device for the automatic control of the capacity of a buffer storage magazine

This invention relates to plants for feeding cigarettes, or the like, and more particularly to the plants for feeding the cigarettes from one or more cigarette-making machines to one or more cigarette-packing machines, said plants having associated therewith at least one buffer storage magazine which communicates with a transit zone for the cigarettes, also called "crossing zone", connected with an inlet for the incoming cigarettes and with an outlet for the outgoing cigarettes, while the capacity of the buffer storage magazine can be varied by means of at least one respective variator element having a reversible movement, which is moved so as to increase the capacity of the magazine and to store therein the cigarettes coming from the transit zone, when the rate of flow of the incoming cigarettes is greater than the rate of flow of the outgoing cigarettes, or to reduce the capacity of the magazine and to give back cigarettes to the transit zone, when the rate of flow of the incoming cigarettes is smaller than the rate of flow of the outgoing cigarettes.

The rate of flow of the outgoing cigarettes from the transit zone is generally the same as the rate of flow of the cigarettes taken up by the machine or machines, particularly by the cigarette-packing machine or machines fed by the feeding plant and located downstream of the transit zone, i.e. connected with the outlet from said zone.

The invention relates to a method and device for the automatic control of the reversible-movement element which varies the capacity of the buffer storage magazine of the above type, whereby cigarettes will be either received into or given back from said magazine.

In the heretofore known plants for feeding cigarettes or the like, which are provided with a buffer storage magazine of the above type, the reversible-movement element which varies the capacity of the buffer storage magazine is controlled by a device which is responsive to the volume of the bulk of cigarettes in said transit zone, e.g. by a level detector arranged at the free upper surface of said bulk of cigarettes in the transit zone. When the rate of flow of the incoming cigarettes is greater than the rate of flow of the outgoing cigarettes, the level of the bulk of cigarettes in the transit zone will rise and, upon reaching a maximum pre-established value, will promote, through the respective detector, the movement of the movable variator element so as to receive cigarettes from the transit zone into the buffer storage magazine. Conversely, when the rate of flow of the outgoing cigarettes is greater than the rate of flow of the incoming cigarettes, the level of the bulk of cigarettes in the transit zone will go down and, upon reaching a minimum pre-established value, will cause, through the respective detector, the reverse movement of the movable variator element so as to give back some cigarettes from the buffer storage magazine to the transit zone. Of course, when the rate of flow of the outgoing cigarettes is the same as the rate of flow of the incoming cigarettes, the level of the bulk of cigarettes in the transit zone keeps substantially constant and the capacity variator movable element does not move.

Presently, the speed of the movable element designed to vary the capacity of the buffer storage magazine is constant in both the directions of movement and is of such a value as to ensure a cigarette receiving and returning rate corresponding to the maximum take-up of cigarettes by the successive processing machine (s) and, therefore, to the maximum rate of flow of the outgoing cigarettes from the transit zone. Due to this circumstance and to the fact that the control of the capacity variator element for the buffer storage magazine is based upon the volume of the bulk of cigarettes at the transit zone, in the hertofore known devices, the density of the bulk of cigarettes at the transit zone is not constant, so that the degree of compaction and, consequently, compression of cigarettes at said zone is variable. A high degree of compaction can be detrimental to the integrity of the cigarettes, whereas a too low degree of compaction can permit the formation of voids with resulting possible upsetting of the cigarettes, which then could arrange themselves crosswise or could jam.

In certain feeding plants of the type described in the preamble, the bulk of cigarettes contained in the buffer storage magazine has a free top surface, and such a free surface tends to dispose irregularly, i.e. with peaks and hills. In normal conditions, said free surface of the bulk of cigarettes in the storage magazine is close to a fixed cover or ceiling of the magazine. When the buffer storage magazine is in the emptying step and the rate of flow of the outgoing cigarettes is lower than the maximum rate and, therefore, is smaller than the rate of flow of the cigarettes returned from the magazine to the transit zone, the high degree of compaction of the cigarettes at the transit zone can cause a jam of cigarettes in the buffer storage magazine and, therefore, a rise of the free surface of the bulk of cigarettes in the magazine, whereby said surface will finally contact the fixed cover or ceiling of the magazine. In this instance - and particularly in case of filter-tipped cigarettes, which form non-perfectly horizontal layers whose inclination increases with their distance from the base -the higher tips of the cigarettes on the surface of the bulk of cigarettes in the magazine will first contact the ceiling of the magazine and will be braked thereby, so that these cigarettes can arrange themselves transversally and cause several disturbances.

The above drawbacks are overcome by this invention thanks to the fact that, repeatedly and each time for a determined time interval, the cigarettes incoming into the transit zone and the cigarettes outgoing from the transit zone are counted and the difference between these two values is calculated to act upon the capacity variator element of the buffer storage magazine so as to increase the capacity of the magazine and, consequently, to receive cigarettes from the transit zone or to reduce the capacity of the magazine and,

consequently, to give back cigarettes to said transit zone, depending upon the positive or negative sign of said difference and with a speed which is proportional to the absolute value of said difference.

The cigarettes incoming into the transit zone may be counted either at the inlet into the transit zone or at any point upstream of said inlet. Similarly, the cigarettes outgoing from the transit zone may be counted either at the outlet from the transit zone or at any point downstream of said outlet. Particularly, as incoming cigarettes, one may count the cigarettes forming one single layer at a section of their feeding travel to the transit zone, while, as outgoing cigarettes, one may count the cigarettes which are taken up in the pre-established time interval by one or more processing machines which process the cigarettes coming from the transit zone, particularly one or more packing machines.

These and other features of the invention and the advantages resulting therefrom will be apparent from the following description of a preferred embodiment which is diagrammatically shown in the accompanying drawings, in which:

Figure 1 shows the feeding plant of a cigarette-packing machine;

Figure 2 is a fragmentary diagrammatic sectional view on the line II-II of Figure 1, in an enlarged scale.

With reference to the Figures, the filter-tipped cigarettes SF, coming from one or more cigarette-making machines and specifically from a device 1 testing the good conditions of the produced cigarettes SF, are fed by a conveyor belt 2 to the vertical ascending suction stretch 103 of a feeding conveyor belt 3 which follows an inverted "L" path of travel. The horizontal stretch 203 of this belt 3 is preferably of the suction type at the final portion thereof and is connected by means of a chute 4 with a successive horizontal conveyor belt 5. The feeding belt 3 is actuated by a variable-speed motor 6. Similarly, the subsequent conveyor belt 5 is actuated by a variable-speed motor 7. The motors 6 and 7 may be, for example, of the direct current type.

The cigarettes SF form one single layer on the ascending suction stretch 103 of the feeding conveyor belt 3 and, therefore, this conveyor belt 3 is moved at the same speed as the cigarettes SF coming from the testing device 1 and, therefore, at a speed which is proportional to the operating speed of the cigarette-making machine(s), not shown, which supply said testing device 1. The single layer of cigarettes is also maintained on the horizontal stretch 203 of the feeding conveyor belt 3. The successive conveyor belt 5 is moved at a lower speed than the feeding conveyor belt 3. As a result, a plurality of superimposed single layers of cigarettes are formed on said conveyor 5. However, the free top surface of this plurality of layers is substantially co-planar with the single layer of cigarettes on the horizontal stretch 203 of the preceding conveyor belt 3, due to the lower level of the conveyor belt 5.

At the end of the horizontal conveyor belt 5 there is the inlet 108 of a so-called "crossing zone" or "transit zone" 8 extending downwardly and defined by side walls 11, 12 and having a bottom opening 208 connected through a vertical duct 9 to the hopper 10 of a cigarette-packing machine. The transit zone 8 communicates, at the side opposite the wall 12, with a buffer storage magazine 13 which - in the illustrated embodiment - is formed by a horizontal conveyor belt 14 which can be moved alternately at will in either direction by means of a variable speed reversible motor, such as a direct current motor 15. A transverse partition element 16, called capacity variator element, is fixed to the upper stretch of the conveyor belt 14 and moves therewith under a fixed cover 17 and between two side walls (not shown).

The transit zone 8, the vertical duct 9 communicating with the outlet 208 and the space of the buffer storage magazine 13 extending to the movable partition or variator 16 are usually full of cigarettes. This bulk of cigarettes merges, through the inlet 108 of the transit zone 8, with the layers of cigarettes carried on the conveyor belt 5 and has a free top surface the level of which is sensed by a suitable detector. In the illustrated embodiment, said level detector is in the form of a feeler arm 18 which rests with an end portion on the free top surface of the bulk of cigarettes in the transit zone 8, and is pivotably mounted at the other end on a horizontal pivot 118, while being operatively connected to an angular position transducer 19. In order to increase the capacity of the buffer storage magazine 13, i.e. to receive therein the cigarettes supplied to the transit zone 8 through the inlet 108 in excess of the cigarettes taken up by the packing machine 10 and delivered from the transit zone through the outlet 208, the variator paritition 16 is moved by the belt 14 away from the transit zone 8, i.e. leftward in Figure 1. Conversely, in order to reduce the capacity of the buffer storage magazine 13, i.e. to give back cigarettes to the transit zone 8 when the amount of the cigarettes supplied through the inlet 108 is smaller than the amount required by the packing machine 10 and, therefore, than the amount of cigarettes delivered from the transit zone 8 through the outlet 208, the variator partition 16 is moved by the belt 14 toward the transit zone 8, i.e. rightward in Figure 1.

According to the invention, in order to control said movements of the variator partition 16, both the cigarettes incoming into the transit zone 8 and the cigarettes outgoing from the transit zone 8 are counted. The count of the incoming cigarettes is effected upstream of the inlet 108 at the single layer of cigarettes on the end portion, preferably of suction type, of the horizontal stretch 203 of the feeding conveyor belt 3, for example, by means of a photocell device 20. The count of the outgoing cigarettes, however, is based on the cigarettes which are taken up by the packing machine. Preferably, counting devices are not provided for this purpose, but advantage is taken of any suitable member of the packing machine effecting operative cyclical movements each corresponding to the take-up of a given number of cigarettes by said packing machine. Thus, for example, one may use for this purpose the reciprocating transfer pusher 21 which expels cyclically, on each active stroke thereof (leftward in Figure 2), from the bottom of the hopper 10, a group SG of any number of cigarettes SF. The transfer pusher 21 may be single, as in the illustrated embodiment, or double or triple. In any case, on the basis of the active strokes of the transfer pusher 21, either of single or multiple

type, the number of cigarettes taken up by the packing machine can be determined.

Practically, a given time interval T, so-called "sampling interval", is established. The cigarettes SF traveling under the photocell 20 in every sampling interval T cause through said photocell 20 a corresponding number of electric pulses which are delivered to a micro-processor (not shown) which controls the motor 15 for actuating the conveyor belt 14. This micro-processor counts the number of said pulses from the photocell 20 and thus determines the number NE of the incoming cigarettes in each sampling interval T. Said micro-processor also determines the ratio NE/T corresponding to the number of incoming cigarettes flowing into the transit zone 8 through the inlet 108 within each unit of time.

Instead, to determine the number of cigarettes taken up by the packing machine, the invention may use, for example, the reciprocating transfer pusher 21, either of single or multiple type, which cyclically expels, upon each active stroke (leftward in Figure 2), a pre-established number of cigarettes from the bottom of the hopper 10 of the packing machine and delivers, for example at the end of each active stroke thereof, a corresponding electric pulse, so-called packing pulse, to the control micro-processor. For this purpose, said transfer pusher 21 can actuate, for example through a lug 121 thereof, and end-stroke detector 22. Since no relation exists between the stroke of the transfer pusher 21 and the origin of time, a given number N of active strokes of the pusher 21 is fixed which corresponds to an equal number N of packing pulses delivered from the detector 22 to the micro-processor. To this number N of packing pulses there corresponds a proportional number NP of cigarettes ejected totally by the transfer pusher 21 from the bottom end of the hopper 10 and, therefore, an equal number NP of cigarettes taken up by the packing machine. The micro-processor receiving the packing pulses determines the number NT of the "sampling intervals" elapsed between the first and the last of the received N packing pulses, and divides the corresponding number NP of cigarettes by said number NT of sampling intervals, thus obtaining the number of cigarettes taken up by the packing machine in each time interval T. This number of cigarettes NP/NT is additionally divided by T in the micro-processor, thus obtaining the number NP/NT.T of the cigarettes taken up by the packing machine for each unit of time, which is the same as the number of cigarettes outgoing from the transit zone 8 through the outlet 208 for each unit of time.

The micro-processor, then calculates the difference Δ between the number NE/T of the cigarettes incoming into the transit zone 8 for each unit of time and the number NP/NT.T of the cigarettes outgoing from the transit zone 8 each unit of time, namely

$$\Delta = \frac{NE}{T} - \frac{NP}{NT.T} = \frac{NE - \frac{NP}{NT}}{T}$$

and, as a function of this difference, it controls the direction and speed of movement of the variator partition 16. Specifically, when the number NE/T of the incoming cigarettes in the unit of time is the same as the number NP/NT.T of the outgoing cigarettes in the unit of time, then $\Delta = 0$ and, therefore, the variator partition 16 is kept still, i.e. the capacity of the buffer storage magazine is not varied. However, when the number NE/T of the incoming cigarettes in the unit of time is greater than the number NP/NT.T of the cigarettes outgoing in the unit of time, then, $\Delta > 0$ and the micro-processor determines the displacement of the variator partition 16 in a direction to increase the capacity of the buffer storage magazine 13, i.e. leftward in Figure 1. Conversely, when the number NE/T of the incoming cigarettes in the time unit is smaller than the number NP/NT.T of the outgoing cigarettes in the unit of time, the, $\Delta < 0$ and the micro-processor reverses the motor 15, i.e. it causes the displacement of the variator partition 16 in a direction to reduce the capacity of the buffer storage magazine 13 (rightward in Figure 1). In both cases, besides determining the direction of rotation of the motor 15 and, therefore, the direction of movement of the partition 16 for varying the capacity of the buffer storage magazine 13, the micro-processor also determines the speed of the motor 15, whereby the capacity variator partition 16 moves at a linear velocity which is proportional to the absolute value of the difference Δ between the number NE/T of the incoming cigarettes in the unit of time and the number NP/NT.T of the outgoing cigarettes in the unit of time. Thus, the capacity of the buffer storage magazine is increased and reduced to such an extent as to accommodate with a substantial precision the excess of cigarettes incoming into the transit zone 8 through the inlet 108, when $\Delta > 0$, and to complement with a substantial precision the rate of flow of the outgoing cigarettes from the transit zone 8 through the outlet 208, when $\Delta < 0$, while keeping the volume and compaction of the bulk of cigarettes in the transit zone 8 substantially constant, and eliminating also the other drawbacks set forth in the preamble of this description.

The direction and speed of movement of the partition 16 for varying the capacity of the buffer storage magazine 13 are determined by the control micro-processor at each sampling interval T on the basis of the actual values NE/T and the values NP/NT.T established in the preceding time interval corresponding to the pre-established N packing pulses. This is based on the assumption that the packing machine operates at constant speed during two successive time intervals, each corresponding to the pre-established N packing pulses. This assumption is normally true.

In the control of the movement of the partition 16 for varying the capacity of the buffer storage magazine 13, it may be desirable to establish a compensation or correction coefficient taking into account the fact that the cigarettes SF being fed have not absolutely constant dimensions and may be more or less ovalized and

deformed when entering the transit zone 8. In fact, due to said deformations or dimension variations of the cigarettes, it may happen that either in the filling and in the emptying steps of the buffer storage magazine 13, i.e. either when this magazine receives cigarettes from the transit zone 8 and when it gives back cigarettes to said transit zone 8, despite of said regulation of the speed of movement of the variator partition 16 - based on the count of the incoming cigarettes and outgoing cigarettes, taken up by the packing machine - the level of the bulk of cigarettes in the transit zone 8 tends to vary (i.e. to go up or down) rather than staying (remaining) substantially constant. In order to avoid these possible level variations of the bulk of cigarettes in the transit zone 8, the control micro-processor receives the signals generated by the angular position transducer 19 actuated by the feeler arm 18 of the level detector and corrects the speed of movement of the partition 16 for varying the capacity of the buffer storage magazine 13, depending upon the sign of the signals received from the angular position transducer 19 and upon the absolute value of these signals. Particularly, in the emptying step of the buffer storage magazine 13, if the level of the bulk of cigarettes in the transit zone 8 tends to rise, the speed of the variator partition 16 is reduced, and if said level tends to go down said speed is increased. Conversely, in the filling step of the buffer storage magazine 13, the speed of the variator partition 16 is increased if the level of the bulk of cigarettes in the transit zone 8 tends to rise, whereas it is reduced if said level tends to go down. In conclusion, the speed V imparted by the micro-processor to the partition 16 for varying the capacity of the buffer storage magazine is expressed by

$$V = K\frac{NE - \frac{NP}{NT}}{T} \pm \Delta V$$

wherein K is a proportionally constant and ΔV is said correction coefficient depending upon the deformations and dimension variations of the cigarettes.

According to a further characteristic of the invention, the count of the number NE of incoming cigarettes in the single layer of cigarettes at the end portion of the horizontal stretch 203 of the feeding conveyor belt 3 in each sampling interval T, is used to ensure a more regular transformation of the single layer of cigarettes, existing on the feeding conveyor belt 3, into the multiple layer of cigarettes existing on the successive conveyor belt 5. In the heretofore known feeding arrangements of the illustrated type, a constant ratio exists between the speed of the two conveyor belts 3 and 5, and an electro-magnetic clutch is provided to stop the conveyor belt 5 if the feeding of cigarettes through the conveyor belt 3 is discontinued. However, according to the invention, the speed of the motor 7 and, therefore, the speed of the conveyor belt 5 carrying the multiple layer of cigarettes, are regulated by the control micro-processor at each sampling interval T as a function of the number of cigarettes NE incoming to the feeding conveyor belt 3 in each unit of time. Therefore, the speed of the conveyor belt 5 is proportional to NE/T. Thus, not only the speed of the conveyor belt 5 for the multiple layer of cigarettes is nullified when the feeding of cigarettes through the conveyor belt 3 is discontinued, but, additionally, it is reduced proportionally when the rate of flow of the incoming cigarettes in the single layer on the feeding conveyor belt 3 is reduced, for example due to possible discarding of defective cigarettes.

Of course, the invention is not limited to the embodiment here shown and described. In particular, the invention may be applied to the plants for feeding any other rod-like articles, other than cigarettes, and specifically to the plants for feeding filter rods or the like. Moreover, the invention may undergo broad changes and modifications, especially of constructional nature. In particular, instead of the photocell device 20, any other suitable means may be used to count the cigarettes in the single layer on the feeding conveyor belt 3, and any other cyclically movable member of the processing machine downstream of the transit zone 8 may be used to determine the number of cigarettes or other rod-like articles taken up by the latter machine. The micro-processor which is used may be of any suitable type, and the level detector for the bulk of cigarettes in the transit zone may also be of any suitable type.

CLAIMS

1. A method for the automatic control of the capacity variator element of the buffer storage magazine associated with a plant for feeding rod-like articles to a processing machine, and more particularly for feeding the cigarettes from one or more cigarette-making machines to one or more cigarette-packing machines, in which plants the buffer storage magazine communicates with a cigarette transit zone, also called crossing zone, connected with an inlet for the incoming cigarettes and with an outlet for the outgoing cigarettes, while the capacity of the buffer storage magazine can be varied by means of at least one respective variator element having a reversible movement which is moved so as to increase the capacity of the magazine and to store therein the cigarettes coming from the transit zone, when the rate of flow of the incoming cigarettes is greater than the rate of flow of the outgoing cigarettes, or is moved so as to reduce the capacity of the magazine and give back cigarettes to the transit zone when the rate of flow of the incoming cigarettes is smaller than the rate of flow of the outgoing cigarettes, characterized in that, repeatedly and each time for a determined time interval also called "sampling interval" (T), the cigarettes incoming into the transit zone (8) and the cigarettes outgoing from the transit zone (8) are counted and the difference between these two values is calculated and the capacity variator element (16) of the buffer storage magazine (13) is

operated so as to increase the capacity of the magazine and, consequently, to receive cigarettes from the transit zone (8) or to reduce the capacity of the magazine and, consequently, to give back cigarettes to the transit zone (8), depending upon the positive or negative sign of said difference and with a speed which is proportional to the absolute value of said difference.

2. A method according to claim 1, characterized in that the number of cigarettes outgoing from the transit zone (8) is determined on the basis of the cigarettes which are taken up by the packing machine in the sampling interval (T).

3. A method according to claim 1, characterized in that the number of cigarettes taken up by the packing machine in the sampling interval (T) is determined on the basis of the number of cyclic movements made by any movable member of the packing machine, specifically on the basis of the active strokes of at least one transfer pusher (21), of single or multiple type, expelling at each stroke one group of cigarettes from the bottom end of the hopper (10) for the packing machine.

4. A method according to claim 3, characterized in that the difference (Δ) is formed between the number of incoming cigarettes in the unit of time (NE/T) and the number of cigarettes taken up by the packing machine in the unit of time (NP/NT.T), the latter number being obtained by dividing the total number of cigarettes (NP), corresponding to a given number (NT) of cyclical movements of said movable member of the packing machine, specifically said transfer pusher (21), by said number of movements (NT) and by said sampling interval (T).

5. A method according to claim 1 characterized in that the speed of the element (16) for varying the capacity of the buffer storage magazine (13) is adjusted as a function of the level variations of the free surface of the bulk of cigarettes in the transit zone (8), by reducing or increasing said speed when said level tends to rise or to go down in the emptying step of the buffer storage magazine, and by increasing or reducing said speed when said level tends to rise or to go down in the filling step of the buffer storage magazine (13).

6. A method according to claim 1, adapted to be used in feeding plants in which the rodlike articles and specifically the incoming cigarettes are arranged in a single layer at least at a portion of their feeding path of travel to the transit zone, characterized in the count of the incoming cigarettes is effected at the single layer of the cigarettes.

7. A method according to claim 1, wherein the rodlike articles and specifically the incoming cigarettes are conveyed to the inlet of the transit zone (8) by means of a conveyor belt (5) carrying a plurality of superimposed layers of cigarettes and fed by a feeding conveyor belt (3) whereon the cigarettes are arranged in a single layer, characterized in that the incoming cigarettes are counted at the end portion, preferably of suction type, of the feeding conveyor belt (3), while the successive conveyor belt (5) carrying the plurality of layers of cigarettes is actuated at a speed which is proportional to the number of incoming cigarettes in the unit of time, counted on the feeding conveyor belt (3).

8. A device for carrying out the method disclosed in the preceding claims, characterized by a micro-processor connected to a device (20) (for example in the form of a photocell) adapted to generate a number of pulses equal to the number (NE) of incoming cigarettes in a given sampling interval (T), and to a device (22) adapted to generate a number of pulses (N) corresponding to the number of cylcic movements performed by any movable member of the packing machine within a given number (NT) of sampling intervals (T) and corresponding to a total number (NP) of cigarettes taken up by the packing machine, said micro-processor being used to determine the number (NE/T) of incoming cigarettes in the unit of time and the number (NP/NT.T) of cigarettes taken up by the packing machine in the unit of time and to calculate the difference therebetween (Δ = NE/T − NP/NT.T), while it controls the reversible and adjustable speed motor (7) of the element (16) for varying the capacity of the buffer storage magazine (13) so as to keep still said variator element (16) when $\Delta = 0$ and to displace it in a direction to increase the capacity of the buffer storage magazine (13) when $\Delta > 0$ or to displace it in a direction to reduce the capacity of the buffer storage magazine (13) when $\Delta < 0$, with a speed which is proportional to the absolute value of said difference (Δ).

9. A device according to claim 8, characterized in that the micro-processor is connected to a device [for example, to a rocking feeler arm (18) associated to an angular position transducer (19)] which is responsive to the level of the free surface of the bulk of cigarettes in the transit zone (8), and it adjusts the speed of movement of the element (16) for varying the capacity of the buffer storage magazine (13) depending upon the direction and absolute value of the level variations of the bulk of cigarettes in the transit zone (8).

10. A device according to any one of claims 8 or 9, characterized in that the micro-processor controls the adjustable speed motor (7) for the conveyor belt (5) carrying the incoming cigarettes in a plurality of superimposed layers to the inlet (108) of the transit zone (8), so as to impart said conveyor belt (5) a speed which is proportional to the number of incoming cigarettes fed in the unit of time to said conveyor belt (5).

11. A device for the automatic control of the capacity variator element of the buffer storage magazine substantially as described with reference to the accompanying drawings.

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